

## **REMARKS**

In the Office Action mailed August 21, 2007, claims 4, 6-8, 15 and 29 were rejected under 35 U.S.C. 112, second paragraph, and claims 1-30 and 35 were rejected under 35 U.S.C. 103(a).

### **Amendments**

Claims 4, 6-8, 15 and 29 have been amended to insert the definition of "DE" that was present in the application as filed on page 4, lines 10-13, for example. No new matter is added by any amendment, and all amendments are supported by the specification and claims as originally filed.

### **35 U.S.C. 112, second paragraph rejection**

In the Office Action mailed August 21, 2007, claims 4, 6-8, 15 and 29 were rejected under 35 U.S.C. 112, second paragraph. The Office Action stated " 'DE' is vague and indefinite because it is unclear how this term further limits the claims."

In response, the abbreviation "DE" has been removed from claims 4, 6-8, 15 and 29 and replaced with the phrase diatomaceous earth. As is known in the art, diatomaceous earth (DE) is "a fine siliceous earth composed chiefly of the cell walls of diatoms: used in filtration, as an abrasive, etc. " ("diatomaceous earth." *Dictionary.com Unabridged* (v 1.1). Random House, Inc. 14 Dec. 2007. <Dictionary.com [http://dictionary.reference.com/browse/diatomaceous\\_earth](http://dictionary.reference.com/browse/diatomaceous_earth)>.) The porous structure of the silica in diatomaceous earth is due to incorporation and release of organic mass. This material is unique in that it allows water molecules to pass through while retaining other larger ions or molecules. In this invention, diatomaceous earth can retain hydroxide crystals of lanthanum and iron because of the high surface area of the DE and the ability to coat internal surfaces of the DE. Hydroxide compounds enter into the internal porous areas as well as external area of the DE. The combined composition enhances the arsenic adsorption of the filter.

It is believed these amendments overcome the rejection. Reconsideration and withdrawal of the rejection is respectfully requested.

### 35 U.S.C. 103(a)

#### Background

The current invention is a method of removing arsenic from drinking and process water using metal salt hydroxide-gels. The metal salt hydroxide-gels used in the current invention are wet and have a high surface area and high positive surface charge.

The process of the current invention is not the same as a direct addition method (such as that of Misra 6197201) where a lanthanum salt (such as a lanthanum chloride) is added to a slurry of minerals or other sample in order to stabilize the arsenic (or other metal) in the sample. In the direct precipitation method, arsenic compounds are precipitated and form a solid material comprising the lanthanum and arsenic (or other metal) which readsorb to the minerals or other fine solids. This solid material is then disposed of. The direct precipitation method leaves a large amount of anions (from the salt) in the water. The anions are toxic to humans and must be removed (see specification page 14). Some other disadvantages of a direct addition method for treating drinking water are described in the current specification on page 11, Example C.

#### Misra/Miyama

In the Office Action, claims 1-3 and 9-14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Misra et al. 6,197,201 in view of JP publication 2001340874A Miyama. The Office Action stated: "Misra et al. disclose a method for removing arsenic from arsenic containing water substantially as claimed. The claims differ from Misra et al. by reciting that the composition comprises a metal salt hydroxide-gel. It is submitted that the composition formed in the water of Misra et al. appears to include a gelatinous precipitate of lanthanum and ferric hydroxides, which is considered indistinguishable

from the recited metal salt hydroxide-gel. Miyama disclose (see Abstract) that it is known in the art to utilize a gel-like material in which an iron hydroxide precipitate is fixed, to aid in removing arsenic from water."

In response, the JP publication does not provide an enabling disclosure and should not be cited against the current claims. The only description provided in the JP publication about the "gel-like material" is "A material for the processing of water containing heavy metals consists of a gel-like material in which an iron hydroxide (III) precipitate is fixed." There is no other information about the "gel-like" material or how to prepare such material. The reference stated "The material is simple to prepare" but the reference does not provide any guidance in the preparation of the material.

The Office Action stated one skilled in the art would be able to modify the method of Misra by utilizing the recited composition in view of the teachings of Miyama. However, as discussed above, there is no enabling disclosure in the JP publication that would allow one of ordinary skill in the art to make the "gel-like material." Therefore, the Miyama reference is not operative, and should not be cited in the current rejections.

Since the Miyama reference is improperly applied and is necessary for the 103(a) rejection, the rejection is overcome. Reconsideration and withdrawal of the rejection is respectfully requested.

In the event the Examiner does not agree with the characterization of the reference, additional arguments are provided below.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined)

must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991), cited from MPEP 706.02(j).

There is not a proper obviousness rejection. First, there is no suggestion or motivation to combine the teachings of Misra with the Miyama reference. The cited sections of the Misra reference disclose treating arsenic-containing solution or slurry with lanthanum and iron sulfate (column 4, line 10). . There would be no motivation to add another iron salt to the mixture such as that from Miyama. Second, there would be no reasonable expectation of success by mixing and matching the anions present in particular iron salts. Third, the references when combined do not teach or suggest all claim limitations. The claims in the current invention require a metal salt hydroxide gel. The metal salt hydroxide-gel of the present invention is defined on page 4, lines 3-5 as "Lanthanum hydroxide optionally combined with other metal hydroxides are referred to as 'metal salt hydroxide-gels.'" It is not seen where the metal salt hydroxide gel of the current claims would be obtained from a combination of the reference teachings.

The Office Action stated "It is submitted that the composition formed in the water of Misra et al. appears to include a gelatinous precipitate of lanthanum and ferric hydroxides, which is considered indistinguishable from the recited metal salt hydroxide-gel." There is no evidence for this statement.

In conclusion, the rejection is believed overcome. Reconsideration and withdrawal of the rejection is respectfully requested.

#### Misra/Miyama/Wang

In the Office Action, claims 4, 5, 8 and 24 were rejected under 35 U.S.C. 103(a) over Misra in view of Miyama and further in view of Wang. The Office Action stated "The

claims differ from the references as applied above by reciting the use of a DE coated filter, or a diatomaceous earth filter.”

The arguments regarding the Misra and Miyama references are applied again here, and are believed to overcome the rejection. In addition, the Wang reference does not disclose removing arsenic from water. The Wang reference recites “removing dissolved, colloidal, volatile, suspended and living contaminants from water or wastewater.” (Wang abstract). There is no mention of heavy metals such as arsenic in the Wang reference. The words “metal” or “arsenic” do not appear in the Wang reference as objects to be removed from water. Therefore, the Wang reference would not be consulted in the development of a process to remove arsenic from water.

Therefore, a proper obviousness rejection is not made. There is no suggestion or motivation to combine the reference teachings of Misra with Miyama and Wang, and there is no expectation of success in such a combination, since the removal of arsenic is a different problem than the removal of other substances. Reconsideration and withdrawal of the rejection is respectfully requested.

#### Misra/Miyama/Wang/Mills

In the Office Action, claims 6, 7, 15-23, 25 and 26 were rejected under 35 U.S.C. 103(a) as being unpatentable over Misra in view of Miyama and Wang and further in view of Mills. The Office Action stated “The claims differ from the references as applied above by reciting the use of a DE filter bed, or DE coated hydroxide gels. Mills disclose that it is known in the art to utilize a diatomaceous earth filter bed, and a composition including diatomaceous earth, aluminum hydroxide, and lanthanum chloride, to aid in filtering water, and in removing contaminants such as dissolved phosphate from water.”

The arguments regarding the Misra, Miyama and Mills references are applied here. In addition, the Mills reference is directed to nonanalagous art. Mills is directed to removing phosphates from swimming pool water. The treatment of swimming pool

water is a completely different process than the treatment of drinking water. One of ordinary skill in the art who is developing a process for removing arsenic from drinking water would not look to the art directed to removing phosphates from swimming pool water. Reconsideration and withdrawal of the rejection is respectfully requested.

#### Farrah/Miyama

In the Office Action, claim 27 was rejected under 35 U.S.C. 103(a) over Farrah in view of Miyama. The Office Action stated "The claim differ from Farrah by reciting that the solution is contacted with a metal salt hydroxide-gel. It is submitted that the absorptive material utilized in Farrah appears to include ferric and aluminum hydroxides which are considered to be indistinguishable from the recited metal salt hydroxide gel." There is no support for this statement. Farrah recites precipitating water-insoluble metal salts onto absorbent surfaces. (column 2, lines 53-67). In the process described in Farrah, the metal cations are absorbed or precipitated onto the adsorbent surface used (column 3, lines 1-2). This would not produce a hydroxide gel.

Also, if one were attempting to solve the problem of removing arsenic from drinking water, they would not look to the teachings of Farrah, which are directed to enhancing the absorptive capacity of an absorbent material. There is no suggestion or motivation to combine the reference teachings of Farrah and Miyama. In addition, all limitations of the claim are not found in the references. Reconsideration and withdrawal of the rejection is respectfully requested.

#### Farrah/Miyama/Misra

In the Office Action, claims 28 and 35 were rejected under 35 U.S.C. 103(a) over Farrah in view of Miyama and further in view of Misra. The Office Action stated "It is noted that Farrah disclose the use of a diatomaceous earth adsorbent material. The claims differ from the references as applied above, by reciting that the metal salt hydroxide-gel comprises lanthanum and iron. "

The arguments regarding Farrah, Miyama and Misra presented earlier are applied here. As stated above, Farrah does not disclose a metal salt hydroxide gel. In addition, Farrah is not directed to removing arsenic from drinking water, but rather, to improving the adsorptive qualities of an adsorbent material. There is no motivation to combine the teachings of Farrah with those of Miyama and Misra since the references are not directed to solving the same problem. As such, there is no expectation of success. Reconsideration and withdrawal of the rejection is respectfully requested.

#### Farrah/Miyama/Mills

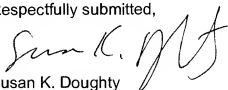
In the Office Action, claims 29 and 30 were rejected under 35 U.S.C. 103(a) over Farrah in view of Miyama and further in view of Mills. The Office Action stated "The claim differs from the references as applied above by reciting the use of a specific DE filter bed. Mills disclose (see col. 4 line 56 through col. 8 line 28) that it is known in the art to utilize a diatomaceous earth filter bed, to aid in filtering water, and in removing contaminants such as dissolved phosphate from water."

In response, as stated above, Miyama is not properly applied because it is not enabling. Mills is not analogous art because the teachings of Mills are used to treat swimming pool water to prevent algal growth, not to remove arsenic from water. In fact, Mills does not mention the word arsenic in the application. Farrah describes a polyvalent metal salt used as an absorbent material to improve the absorptive capacity of the absorbent material. One who was attempting to solve the problem of removing arsenic from drinking water would not use the teachings of Mills or Farrah, and there are no actual teachings of Miyama. There is no suggestion or motivation to modify the reference teachings, and no expectation of success in any combination of reference teachings. Reconsideration and withdrawal of the rejections is respectfully requested.

**CONCLUSION**

In view of the above arguments and amendments, it is believed all rejections are overcome. Reconsideration and withdrawal of all rejections is respectfully requested. This response is accompanied by a Petition for Extension of Time (one month) and an authorization to charge the fee due (believed to be \$120.00 for a large entity) to Deposit Account No. 07-1969. If this is incorrect however, please charge any fees required, including any extensions of time required, to Deposit Account No. 07-1969.

Respectfully submitted,



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